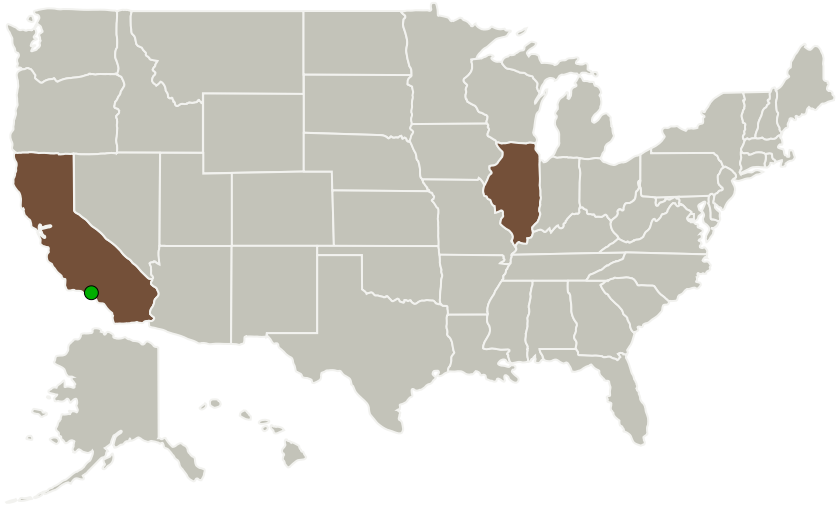
Hall-Effect Thruster Modifications for Dual-Mode Electric Propulsion, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

The integrated NASA/DoD electric propulsion objectives are for a specific mass less than 3 kg/kW while demonstrating a throttlable thrust-to-power ratio of 100:1 at a specific impulse of 1,000 sec down to 40:1 at 4,000 sec with an operational lifetime exceeding 20,000 hours. Modern Hall-effect thrusters (HETs) are a proven technology with flight heritage, established manufacturing readiness and testing channels that nearly meet the desired specifications (as shown in Figure 1). However, the major limitation is that HETs fail to achieve all four of objectives simultaneously. This Phase I feasibility study is focused on a proof-of-concept experiment to alleviate the HET dual-mode operational envelope limitation for both high thrust-to-power and high specific impulse. Starfire Industries believes that a "low hanging fruit" modification to HETs exists, and such an improvement would be evolutionary to enable multi-mission EP systems for NASA's Science Mission Directorate and DoD platforms. Towards this end, Starfire has partnered with Aerojet Corporation to rapidly demonstrate feasibility in Phase I through experimental modification to an existing HET system. If results are confirmed, a Phase II design can be driven to yield immediate upgrades for flight-qualified HET systems for near-term payback.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Starfire Industries LLC	Lead Organization	Industry	Champaign, Illinois
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Illinois

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138189)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Starfire Industries LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

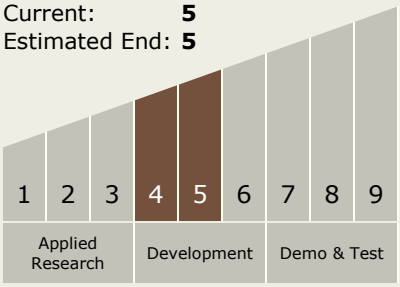
Carlos Torrez

Principal Investigator:

Brian E Jurczyk

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.3 Electromagnetic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System